Closeout Report
Superconductor and Magnet Review

4 March 2004

Charge Question Number 1

Have the recommendations of the last review properly been taken into account?

1. Direct the activities of the welding task force to resolving the welding challenges at Alstom. If this cannon be resolved, consider reallocation of dipole production.
2. Ensure that all main magnet manufacturers attain peak series production rates within the next six months.
3. Institute a task force to resolve the challenges with the corrector magnets.
4. Consider reallocation of the smaller cables to other manufacturing facilities. Consider reallocation of some cabling at Brugg.
5. Mount a campaign at CERN to assemble and cryogenically test dipole magnets at the peak series production rates required.
6. Institute a project integration board (across divisions) to resolve priorities in the procurement, manufacturing and installation activities.

Charge Question Number 2

Is the superconducting cable (01-02, 03, 04-07, 05-06 type) production advanced enough to assure a reasonable safety margin with respect to the needs of the whole magnet production program?

Furakawa has completed its initial contract and OKAS/IGC will be finished shortly. Alstom is progressing nicely. The chronic challenges with the other players remain. See Arjan Verweij's planning graph of production rates.

Charge Question Number 3

Is the planned flow of CERN supplied components and the actual present delivery rate sufficient to satisfy the whole magnet production program? Is any reallocation of contracts necessary to assure a safe flow of components?

The management of the CERN supplied components appears to be very well organized. At the present time components are being delivered to vendors on a timely basis. There are some challenges with a few vendors and these are being addressed. In particular the firm FSG is a concern. There are quality problems with the buss bars being produced at BINR.

Charge Question Number 4

Are the assembly procedures and the tooling well functioning, established and industrially reliable with respect to the present delivery schedule and will they assure the necessary quality of the magnets? Are there unnecessary constraints?

There are a few examples where assembly procedures are evolving. The reduction to industrial production of the welding press and automatic welding has shown various degrees of success from acceptable to not acceptable. Protection layer development.

Charge Question Number 5

Is the quality control/test program sufficient to assure the quality of the magnets for operation in the accelerators? Have adequate resources been allocated to this program?

NON! The QC operations at the CMAs may need some oversight. There was an example given at Noell where a curing cycle was shortened but that the vendor's management had certified compliance to procedures. CERN may want to consider an oversight or audit function for the production/QC travelers.

At present the CERN program to cryogenically test and train the magnets is not providing information that checks for systematic errors at the vendors.

Charge Question Number 6

Is the planning well founded? If not, are there measures to be taken that can secure the schedule?

The planning is well founded. However, “The best laid plans of …” All projects evolve and as information is gathered management must react.

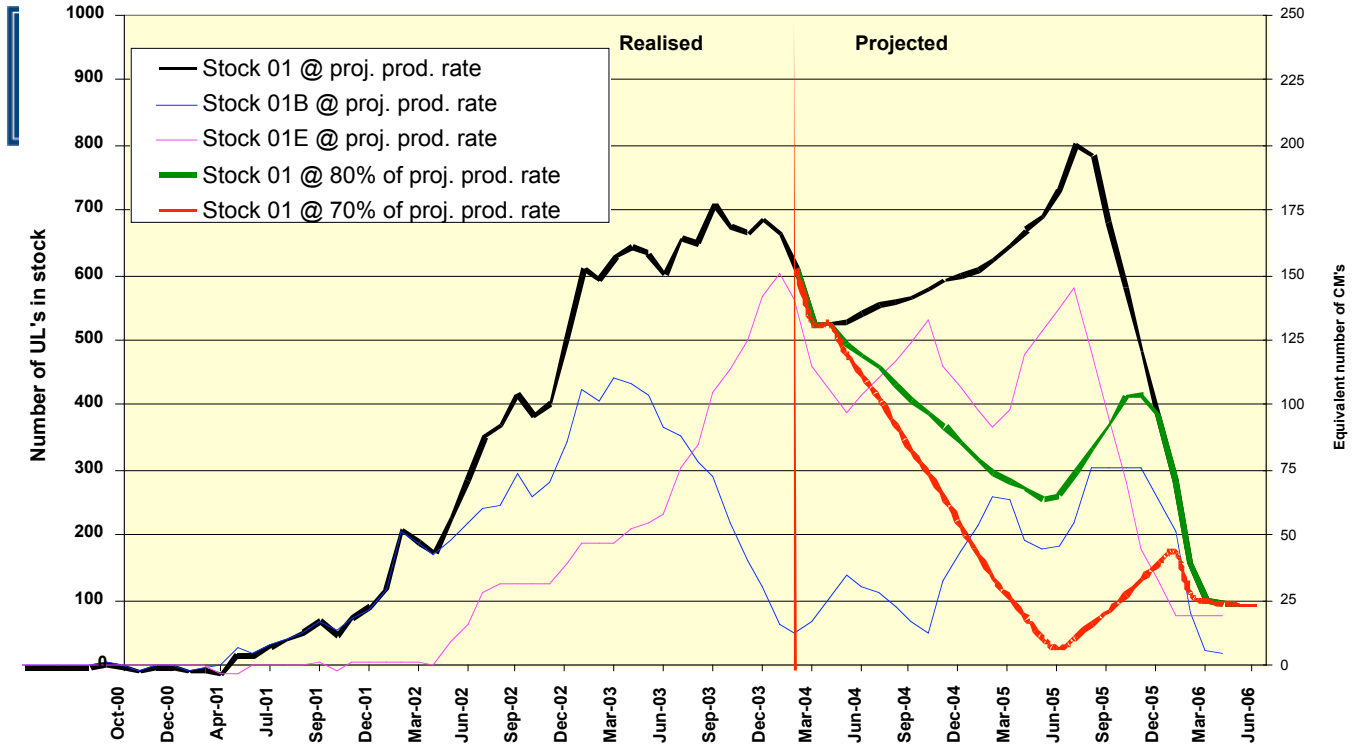
Conductor & Cable Summary

- The buffer of cable is adequate at present to insure that the magnet vendors have a reliable supply to meet their production goals
- The quality of the wire and cable is good. The testing facilities at CERN and BNL are providing fast turnaround and timely feedback to the vendors.

Conductor & Cable Summary - 2

- **The schedule and the cable supply buffer is being maintained by several manufacturers who are performing very well.** This situation is masking a potential supply problem that will develop if the poorer performers do not come up to speed in the next few months. A new management tool to measure cable delivery impact on magnet production was introduced by Verweij, and the plot for the inner cable is shown in Fig. 1. As this figure shows, if the actual production rate falls below 70 % of the projected production rate, the cable inventory is nearly exhausted in June 2005. If this occurs, and the dipole magnet production goals are met, cable 1 deliveries will have a serious impact. (Including cost implications that are tied to the commitment of CERN to delivery cable as needed to the magnet manufacturers).

Conductor & Cable Summary - 3



Cryodipole Summary

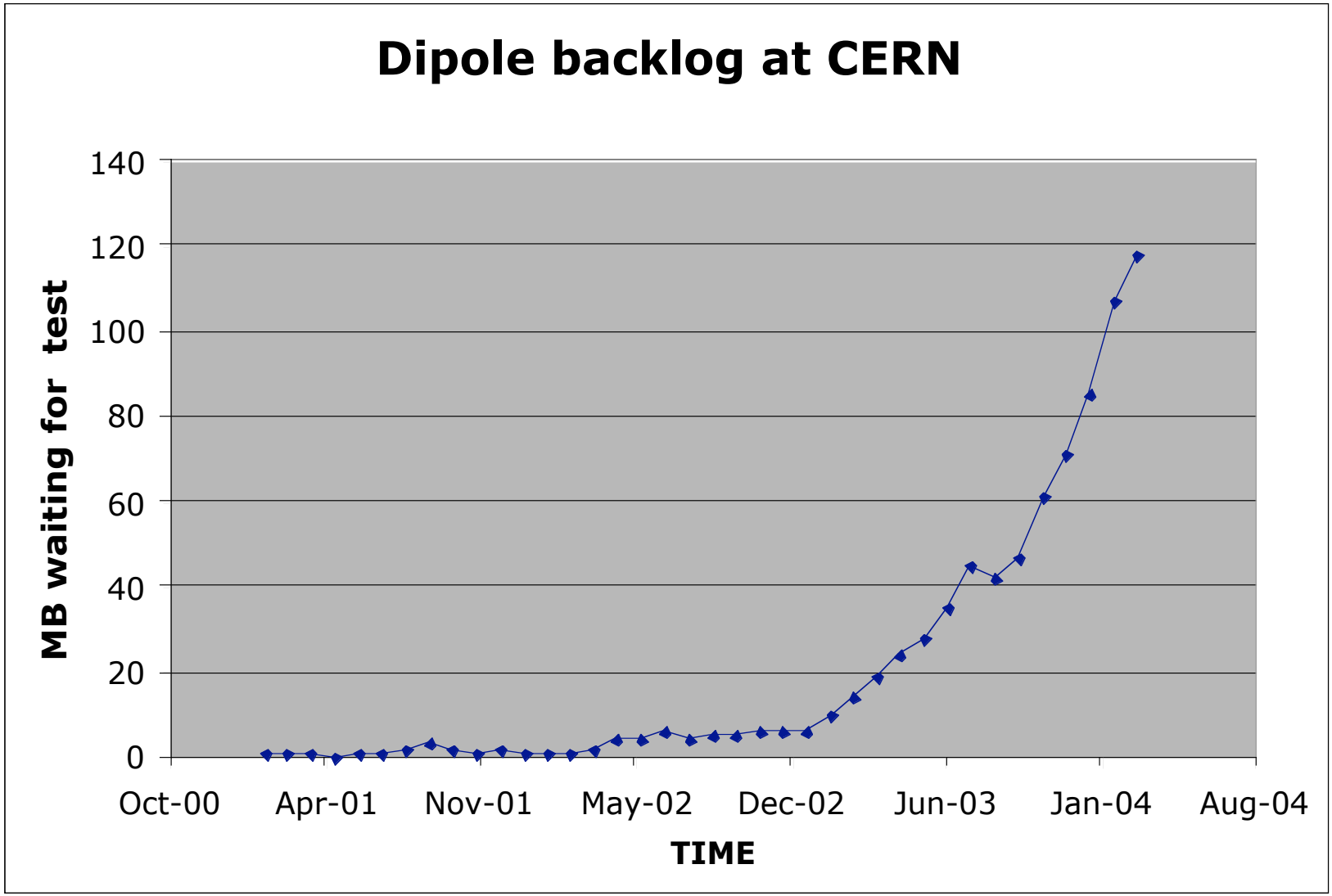
- Alstom must finish their effort to make the automatic welding machine more reliable.
- Review the preventive maintenance plans of each company to asses the long term reliability of the tooling.
- Check and improve the internal quality control of the CMAs
- Reinforce the on-site monitoring by the PEs : need a strong follow-up at the beginning of the full rate production.
- Improve the technical coordination between the CMAs on new technical problems, which can arise during the production.
- Push Ansaldo and Alstom to reach and maintain their full production rate within the following **weeks**.
- Improve the feed-back from the cold tests.

QA/QC

- It is now time to revise the control plan to reduce some in process tests and to check if all parameters are under control.
- The are 120 dipoles awaiting cold testing.
- As soon as delivered 1 out of 4 dipoles per manufacturer should be tested to provide the required feedback.
- It is important that the planned increase of cold test benches proceed on schedule.

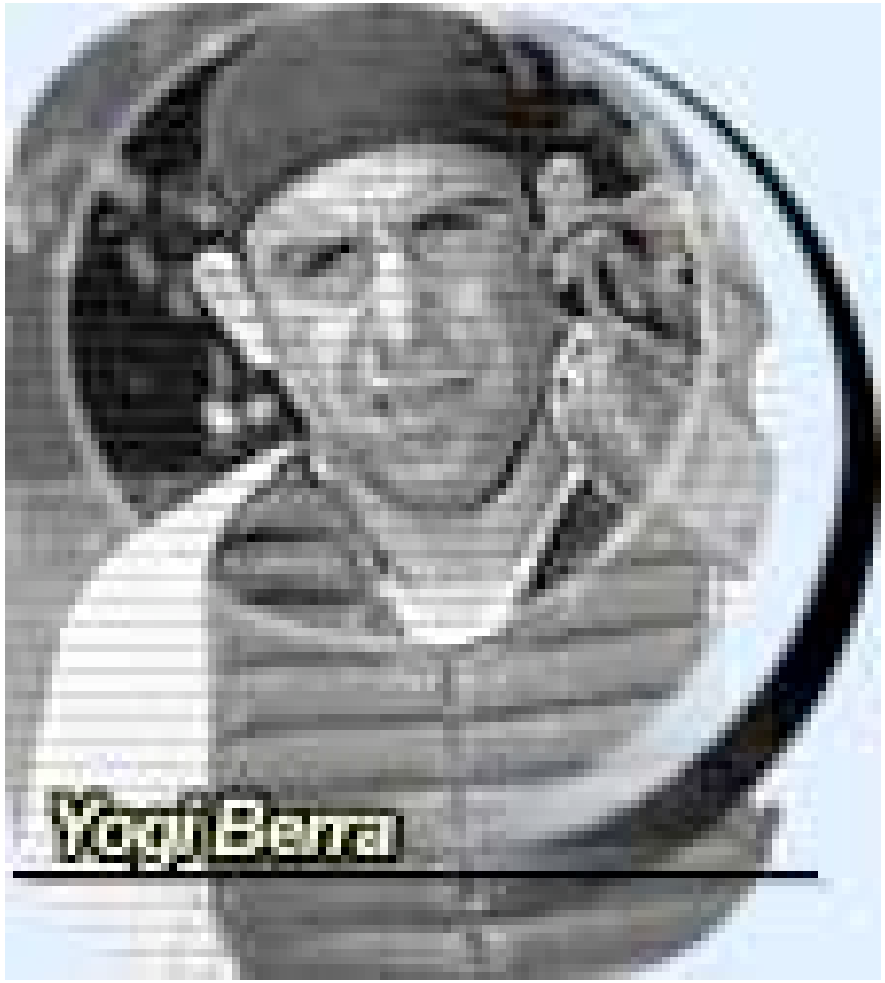
QA/QC

- The QA/QC system is evolving as the manufacturing process is being finalized.
- The non conformities observed at the final acceptance tests of the dipoles demonstrated the need for quick feedback to the production line.
- As a result manufacturing and control procedures have modified and additional tests have been introduced. (Ansaldo)
- Established procedures must be strictly followed to avoid problems in the final product. (Noell)


Dipole backlog at CERN
MB waiting for test
140
120
100
80
60
40
20
0
Oct-00
Apr-01
Nov-01
May-02
Dec-02
Jun-03
Jan-04
Aug-04
TIME

Parting Thoughts

4 March 2004



"You've got to be very careful if you don't know where you're going, because you might not get there."

"It ain't over 'til its over!"

Yogi Berra